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CYSTICERCUS OVIS AND TAENIA OVIS

ANNOTATED BIBLIOGRAPHY

No. 1

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HELMINTHOLOGICAL ABSTRACTS

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DEIRDRE A. CZIPRI BSc.

Cysticercus ovis and Taenia ovis — Annotated Bibliography 1932-1961

Veterinariya

AKHMEDSHIN, M. A., 1956.—[*Cysticercus* infestation of sheep in the southern Transural.] [Abstract.] 33 (5), 47. [In Russian.]

Cysticercus ovis was present in 3.5% of slaughtered sheep from North Kazakhstan and the Chelibinsk region. The cysticerci were found in the heart, mostly under the pericardium, and only in two cases was general infection of the muscles observed. G.I.P.

Report. Department of Agriculture, New Zealand.

ANON., 1956.—“Annual Report of the Director-General of Agriculture for the year ended 31st March, 1956.” Year 1955-56, 178 pp. [See pp. 49-50, 70-71, 114-115.]

Parasite-free lambs, reared indoors, were left on worm-free pastures for several months; one half was infected artificially with nematode larvae, the other was used as a control. Both lots grew well on long mature feed during the dry period of January and February. With the advent of rains both lots ceased to grow when the pasture was short, leafy and well controlled by topping and typical ill-thrift developed in both lots. The clinical complications which usually occur in the field were absent. It is concluded that, in hogget ill-thrift, parasites (except occasionally *Haemonchus contortus*) were not causative but were of secondary importance, and that the immature forms although more resistant to phenothiazine than the adults, were unimportant. Trials were again made on the effect of particle size on the efficiency of phenothiazine. A sample in which all the particles were less than 10μ in diameter was significantly better than coarser samples. Near Wallaceville, worm larvae in spelled pastures under controlled rotation were not affected adversely for periods up to one month in the hottest and driest summer months, but decreased in those spelled during the winter. The number of larvae on the herbage in the weeks following flooding were the highest for the year. In spite of intensive publicity over a period of years the incidence of hydatid in slaughtered stock has not diminished, while that of *Cysticercus ovis* is increasing and has almost reached 1% of the ewes and lambs slaughtered at a big works at Auckland. R.T.L.

Veterinary Record.

ANTHONY, D. J.—“*Taenia ovis* cysticerci in mutton.” XIII (22), 520. [1933.]

(f) Extensive infection of a sheep's carcass with *Cysticercus ovis* is recorded by Anthony, but the locality from which the carcass came is not mentioned. R.T.L.

BRYDON, P., 1960. [State Abattoir, Homebush, N.S.W., Australia.] “The major causes for condemnation of meat in N.S.W.” *Australian Veterinary Journal*, 36 (4), 113-117. The author discusses the main causes for the condemnation of meat in 1959 at the State Abattoir, Homebush, New South Wales and gives some interesting statistics. Condemnations resulting from helminth infections include hydatids (carcasses and livers), and liver-fluke (livers) for cattle; hydatids, sparganosis (carcasses), kidney worm, and *Ascaris lumbricoides* (livers) for pigs; hydatids, *Cysticercus tenuicollis* and liver-fluke (livers) and *C. ovis* (hearts) for sheep. Condemnations for larval cestodes in sheep are described as rather alarming and apparently increasing. The author also refers to condemnation of intestines for sausage casings through infection with *Macracanthorhynchus hirudinaceus* in pigs and *Oesophagostomum columbianum* in sheep. F. H. S. Roberts

Bulletin de l'Académie Vétérinaire de France.

CAUCHEMEZ, NAIN & PRUDHOMME, 1939.—“La ladrerie des petits ruminants. Un cas de ladrerie ovine.” 12 (7), 339-347.

After passing rapidly under review records of cysticerci in domesticated animals, other than pig and ox, Cauchemez and his co-workers describe a case of *Cysticercus ovis* from a sheep. This species is very rarely found in France. They show how the shape and size of the hooks preclude any confusion with *C. cellulosae*. B.G.P.

Cysticercus ovis and Taenia ovis — Annotated Bibliography 1932-1961

Australian Veterinary Journal.

DRABBLE, J.—“Measles (*Cysticercus ovis*) in sheep in New South Wales.”
x (2), 57-59. [1934.]

Drabble reports a case of severe infection with *Cysticercus ovis* in a sheep from the State Abattoir at Homebush Bay, N.S.W. Several other instances were seen but the cysts were either too degenerate or too calcified to afford microscopical determination. These changes apparently commence early.

R.T.L.

FEWSTER, G. E., 1960. [Department of Primary Industry, Melbourne, Victoria, Australia.]
“Major causes of condemnation of meat.” *Australian Veterinary Journal*, 36 (4), 117-121.
In this paper the author discusses the major causes of carcass condemnation for cattle, sheep, lambs and pigs in various parts of Australia. The tables presented include references to *Cysticercus bovis* in cattle and *C. ovis* in lambs.

F. H. S. Roberts

Instituto de Parasitología y Enfermedades Parasitarias. Facultad de Agronomía y Veterinaria. Universidad de Buenos Aires.

GELORMINI, N., 1939.—“*Cysticercus cellulosae* y *Cysticercus ovis*.” 1 (4), 11 pp.

Australian Veterinary Journal.

GORDON, H. McL., 1939.—“A note on the experimental transmission of *Cysticercus ovis*.” 15 (3), 125-126.

Gordon has infected a dog with *Taenia ovis* by feeding it experimentally with *Cysticercus ovis*. Segments subsequently fed to 2 young sheep resulted in gross infestation, most of which proved to be degenerated at the autopsy 5 months later.

R.T.L.

Tijdschrift voor Diergeneeskunde.

GRAAF, C. DE, 1936.—“Een en ander over de cysticercosis bij het schaap.” 63 (10), 547-556. [English summary p. 556.]

The author reviews the literature on *C. ovis* and concludes that the occurrence of *C. cellulosae* in sheep has not been definitely established nor disproved. In Holland *C. cellulosae* practically does not occur but *C. ovis* is not infrequent and therefore not identical with *C. cellulosae*. Measly sheep carcasses are passed for human consumption.

H.M.

Revue Générale de Médecine Vétérinaire.

JALABERT, H.—“Lésions kystiques du mouton, Ladrerie atypique.” XLII (496), 214-215. [1933.]

Jalabert describes what may have been a case of atypical cysticercosis in a sheep. Numerous small cysts in the carcass were found to be acephalous and to contain blood clots. They may have been cysticerci in course of organization.

B.G.P.



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Cysticercus ovis and Taenia ovis — Annotated Bibliography 1932-1961

Bulletin de la Société de Pathologie Exotique.

JOYEUX, C. & BAER, J., 1939.—“ Sur quelques cestodes de Madagascar.” 32 (1), 39-43.

(i) *Ophryocotyle bücki* n. sp. from *Lophotibis cristata* is differentiated from *O. herodiae*. (ii) For the first time in Madagascar a cysticercus has been found in sheep. The dimensions of the hooklets agree with those of *Cysticercus ovis*. The possibility of a plurality of species of *Cysticercus* in sheep is discussed. It is pointed out that *Cysticercus cellulosae* has been reported from a number of hosts besides the pig and may possibly infect sheep.

R.T.L.

Bulletin de la Société de Pathologie Exotique.

JOYEUX, C., BAER, J. & MARTIN, R., 1936.—“ Sur quelques cestodes de la Somalie-Nord.” 29 (1), 82-96.

Joyeux, Baer & Martin describe the following new species from birds and mammals of Somaliland: *Cotugnia meleagridis* n. sp., *C. polyantha* var. nov. *oligorchida*, *Idiogenes bucorvi* n. sp., *Choanotaenia abassenae* n. sp., *Dipylidium otocyonis* n. sp., *Paruterina daouensis* n. sp., *Hymenolepis recurvirostrae* var. nov. *magnosacco*. *Cysticercus ovis* occurs in sheep, *Raillietina echinobothrida* and *R. cesticillus* are common in domestic fowls, *Hymenolepis microstoma*, *H. fraterna* and *H. diminuta* occur in *Mus orientalis*, while *Taenia hydatigena*, *T. serialis*, *T. pisiformis*, *Echinococcus granulosus*, *Dipylidium caninum*, and *Mesocestoides lineatus* are all found in domestic dogs.

E.M.S.

Sovetskaya Veterinariya.

KAYUKOV, S. G., 1940.—[Cysticercosis ovis.] 17 (8/9), 94. [In Russian.]

Zeitschrift für Fleisch- und Milchhygiene.

KELLER, 1938.—“ Versuche über die Abtötung der Rinderfinne durch CO₂-Atmosphäre.” 49 (3), 43-45.

After reviewing other methods adopted for killing cysticerci in meat, Keller describes experiments carried out to determine the effect of carbon dioxide. Cysticerci in meat kept in pure CO₂ at 0°C. were still viable after 7 days; after 9 days 75% were dead, and after 10 days all cysticerci had been killed. Controls were still viable after 10 days. Experiments with oxygen had similar results, but the author states that these were not extensive enough to be conclusive.

A.E.F.

Zeitschrift für Fleisch- und Milchhygiene.

KELLER, H., 1941.—“ Wandel und Stand der Untersuchungen über die Gesundheitsschädlichkeit der Muskelfinnen des Schafes und Rehes.” 51 (8), 102-105.

Though *Cysticercus cellulosae* has been reported in the past from both sheep and deer, all the evidence points to the fact that such records are mistaken. “*Cysticercus cellulosae*” from the sheep is probably *C. ovis*; from the goat is *C. caprioli*. Both these cysticerci seem to be non-pathogenic and meat containing such cysts is suitable for human consumption. P.A.C.

Zeitschrift für Fleisch- und Milchhygiene.

KOLBE, F., 1938.—"Neueres über die gesundheitsschädlichen Finnen der Schlachttiere und die Finnen des Wildes. Sammelreferat." 48 (7), 126-127.

Concluding his review of recent literature on cysticerciasis [see Helm. Abs., Vol. VI, No. 392a], Kolbe briefly deals in this part with *C. ovis* and *C. cervi*, with which he considers *C. tarandi* (= *C. krabbei*) to be probably synonymous.

B.G.P.

Tijdschrift voor Diergeneeskunde.

KUIPERS, K. R.—"Cysticercose bij het schaap." LX (2), 68. [1933.]

Kuipers records a severe infestation of *Cysticercus ovis* in a sheep. The parasites were found in the subcutaneous connective tissue as well as in all muscles.

H.M.

KUZNETSOV, M. I., 1958. [Incidence of echinococcosis and cysticerciasis in animals slaughtered at Armavir (Northern Caucasus).] Byulleten Nauchno-Tekhnicheskoi Informatsii Vsesoyuznogo Instituta Gel'mintologii im. Akademika K.I. Skryabina, No. 4, pp. 47-48. [In Russian.] Of 430 pigs, 1,100 cattle and 1,300 sheep and goats examined at the Armavir slaughterhouse, hydatid was identified in 15, 68 and 215 animals, respectively, and cysticerciasis in two, seven and none. These figures are representative of the average rates of infection occurring in various areas of the Krasnodar and Stavropol Territories.

G. I. Pozniak

MACKERRAS, M. J., 1958. [Queensland Institute of Medical Research, Brisbane, Australia.] "Catalogue of Australian mammals and their recorded internal parasites. I-IV. Part III. Introduced Herbivora and the domestic pig." Proceedings of the Linnean Society of New South Wales, 83 (2), 143-153.

In this part the author gives the names of 11 introduced mammals: pig, dromedary, ox, sheep, goat, horse, donkey, mule, zebu, water-buffalo and red deer. There are no records of parasites from the last-mentioned five. Only four species of trematodes have become established, namely, the liver-fluke and three flukes inhabiting the rumen of sheep and cattle. Three species of adult cestodes occur in the horse, and four in ruminants. Hydatids have been recorded from sheep, cattle, goats, pigs, horses and camels. Larval stages of other dog tapeworms occur in sheep, cattle, goats and pigs. Numerous species of nematodes are present in stock, most important being species of Trichostrongylidae in sheep and cattle, and of Strongylidae in the horse. One acanthocephalan is known from the pig. A long bibliography is attached to this paper.

W. M. Fitzsimmons

MCCLEERY, E. F. & WIGGINS, G. S., 1960. [Metropolitan Cattle Market, Islington, London, England.] "A note on the occurrence of *Cysticercus ovis* in sheep derived from sources within the United Kingdom." Veterinary Record, 72 (43), 901-903.

Of a total of 59,415 British sheep examined at meat inspection in 1959, 115 (0.194%) were infected with *Cysticercus ovis*. 41% of the infections were in sheep from Cumberland, 15% from Kent and about 4% from the rest of the U.K. The cysts, frequently containing pus or partly calcified, were equally common in all age groups of slaughtered sheep and occurred most frequently in the heart and diaphragm, but were also noted in most muscles of the carcass. Cysts may be present in the carcass muscle when absent from the heart, and it is possible that they may escape detection until the carcass is jointed or even bought by the consumer. The authors stress the desirability of making exploratory incisions into the musculature when cysts are detected in any position.

W. M. Fitzsimmons

Cysticercus ovis and Taenia ovis — Annotated Bibliography 1932-1961

Revue Vétérinaire et Journal de Médecine Vétérinaire et de Zootechnie.

MAROTEL & VITU—"Troisième observation française de ladrerie ovine." LXXXV, 321-333. [1933.]

The finding of about 300 mostly dead or calcified cysticerci, particularly numerous in the heart and diaphragm and less so in the tongue and masseters, in a sheep's carcass has prompted Marotel and Vitu to review the question of measles in mutton. From an examination of the relevant literature they conclude that all specifically determined cases refer to *Cysticercus ovis* Maddox, 1873, the adult form of which, *Taenia ovis*, is found in the dog. They consider that measles in mutton is not due to the cysticercus of *T. hydatigena*, which differs from all cysticerci described from sheep muscles in the number and dimensions of the rostellar hooks, but may be due to the cysticercus of *T. solium*, which can only be proved by experimental feedings, and consequently they advocate the seizure, by meat inspectors, of all measly mutton. [Readers may find the scientific terminology in this paper somewhat confusing as the authors consider the parasite ought to bear the same name whether it be in the larval or adult stage: e.g., the cysticercus of *Taenia solium* ought to be called *Cysticercus solius* [!] and not *C. cellulosae*, that of *T. hydatigena*, *C. hydatigenus* and not *C. tenuicollis*.]

J.N.O.

MERLE, A., 1958. "Les cysticercoses communes à l'homme et aux animaux." *Bulletin de l'Office International des Epizooties*, 49 (7/8), 483-500.

Merle briefly reviews the occurrence of cysticerciasis in man, ox and pig and diphyllobothriasis in man and fish. The world-wide incidence of porcine and ovine cysticerciasis is presented in tabular form and discussed. Of the countries where records are available, porcine cysticerciasis is most serious in Madagascar (10%) and the Cameroons (9%). Bovine cysticerciasis is most serious in Kenya, Ethiopia and the Belgian Congo (15-80%); the incidence, although low, is slowly increasing in Britain, Germany, Italy, the Low Countries, Switzerland and Hungary. *Diphyllobothrium* infection is most frequently encountered in areas around the Baltic and North Seas, the Danube delta, and the Swiss and Italian lakes. Taeniasis and cysticerciasis in man are briefly discussed.

G. M. Urquhart

Onderstepoort Journal of Veterinary Science and Animal Industry.

ORTLEPP R. J., 1938.—"South African helminths. Part II. Some taenias from large wild carnivores." 10 (2), 253-274.

Taenia multiceps and *T. serialis* are recorded from jackals, *T. pisiformis* from a wild dog, and 7 new Taenias are described and figured from large wild carnivores in South Africa, viz., *T. bubesei* n. sp. and *T. gonyamai* n. sp. from *Leo leo krugeri*, *T. ingwei* n. sp. from *Panthera pardus*, *T. hlosei* n. sp. and *T. acinomyxi* n. sp. from *Acinomyx jubatus jubatus*, and *T. jakhalsi* n. sp. and *T. pungutchui* n. sp. from *Thos mesomelas mesomelas*. The 41 species of the genus *Taenia* now known are tabulated with details of hooks, number of testes, number of main uterine branches, the sizes of the eggs, and the hosts.

R.T.L.

Yearbook of Agriculture. U.S. Department of Agriculture.

PORTER, D. A. & KATES, K. C., 1956.—"Tapeworms and bladderworms." Year 1956, pp. 153-156.

Australian Veterinary Journal.

PULLAR, E. M., 1939.—"The fox (*Vulpes vulpes* L. 1758) as a definitive host of *Taenia ovis* (Cobbold 1869) Ransom 1913." 15 (3), 123-125.

The comparative rarity of adult *Taenia ovis* in the dog is difficult to reconcile with the frequency of *Cysticercus ovis* in sheep. Pullar has found 3 natural infections in the fox near Stawell in Victoria, Australia.

R.T.L.

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Journal of the Department of Agriculture of Victoria.

PULLAR, E. M., 1939.—"The sheep measles parasite." 37 (9), 415-419.

An examination of dogs and foxes in Victoria has shown that *Taenia multiceps* is absent from the State. *T. ovis* occurs in about 5.1% of rural dogs, 1.7% of urban dogs and 13.5% of the foxes. It would seem, therefore, that the fox is an important definitive host of this parasite. *Echinococcus granulosus* was present in urban dogs but not in rural dogs or foxes.

P.A.C.

Australian Veterinary Journal.

PULLAR, E. M., 1946.—"A survey of Victorian canine and vulpine parasites. I. Material and methods used in the investigation. II. *Taenia multiceps*, *Taenia ovis* and *Echinococcus granulosus*." 22 (1), 12-21.

Australian Veterinary Journal.

ROBERTS, F. H. S., 1940.—"Notes on some helminths infesting domestic animals in Queensland." 16 (1), 30-33.

Roberts records *Necator americanus*, *Trichostrongylus colubriformis*, *T. axei* and *Strongyloides* sp. from pigs, *Capillaria columbae* and *C. collaris* from poultry, and *Angiostrongylus vasorum* and *Taenia ovis* from the dog in Queensland.

R.T.L.

Service Publication. Division of Veterinary Hygiene, Department of Health, Australia.

SEDDON, H. R., 1948.—"A review of communicable diseases of animals in Australia. With indications of their economic importance, distribution and incidence in 1946-47." No. 3, 37 pp.

Helminth parasites mentioned as not so far recorded in Australia are *Multiceps multiceps*, *Trichinella spiralis* and *Syngamus trachea*. *Cysticercus bovis* is enzootic at the Metropolitan Sewage Farm, Victoria, and cases of taeniasis saginata have been recorded in young children in Western Queensland. *C. ovis* is widespread and a cause of economic loss in Victoria, South Australia and Western Australia; the fox appears to be the normal host in Victoria. *C. tenuicollis* is relatively common in all areas where fat lambs are raised. *C. cellulosae* has been doubtfully recorded in Western Australia (two cases) and Victoria. Hydatids are common in cattle and sheep, and to a lesser extent in pigs, in all States; *Echinococcus granulosus* is not infrequent in dogs on stock farms but is now absent from dogs in most capital cities where meat inspection is properly carried out. *Fasciola hepatica* occurs in the higher rainfall areas of all States except Western Australia and the Northern Territory; the snail intermediaries are given as *Simlimnea brazieri* (New South Wales, parts of Queensland and Victoria, ?Tasmania) and *S. subaquatalis* (South Australia). *Oesophagostomum columbianum* produces serious effects in the summer rainfall areas of Queensland and New South Wales; it is absent from the other States, where *O. venulosum* occurs but is much less serious. *Onchocerca gibsoni* occurs in several States and is a cause of rejection of beef for export. *Oxyspirura mansoni* is confined to northern Australia. *Dirofilaria immitis* is a serious cause of ill-health in dogs in northern areas. *Stephanurus dentatus* is most serious in the enzootic areas of Queensland and northern New South Wales where it causes pig mortality and interferes with growth and fattening; it does not occur in South Australia, Tasmania or Western Australia. *Haemonchus contortus* is the most important stomach worm of sheep and cattle in the high summer and general rainfall areas of Australia; it is not a problem in South Australia. *Trichostrongylus* spp. are very widely distributed throughout sheep-raising areas and are particularly important in the winter rainfall areas. *Bunostomum phlebotomum* is a serious parasite of calves of coastal areas of Queensland and New South Wales.

E.M.S.

Boletín de Informaciones Parasitarias Chilenas.

TAGLE V., I., 1952.—"Un caso de cisticercosis muscular en la oveja." 7 (4), 68.

Tagle reports a case of muscular cysticerciasis in a sheep. No adults were found in dogs to which the cysts were fed.

R.T.L.

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Journal of the Department of Agriculture. Western Australia.

TOOP, C. R., 1946.—“The cystic tapeworms (bladder-worms) of sheep.” *29* (2), 12-18.

Three cystic tapeworms occur in sheep in Western Australia. Of these *Cysticercus ovis* and hydatid cysts are of considerable importance. *Cysticercus tenuicollis* is only important owing to the possibility that it may be erroneously diagnosed as *Echinococcus*. Control measures for all 3 species should be directed towards the prevention of infection of dogs and by treatment for the removal of their adult worms. R.T.L.

Journal of Agriculture of Western Australia.

TOOP, C. R., 1956.—“The cystic tapeworms (bladder-worms) of sheep.” 3rd series, 5 (6), 755-759.

Bulletin de l'Office International des Épidémiologies.

TRAWINSKI, A., 1957.—“La cysticercose chez les animaux et chez l'homme et spécialement la cysticercose du cerveau.” 48, 191-198. [English summary p. 197.]

Trawinski briefly reviews infection with larval tapeworms in pigs, cattle, sheep, goats, rabbits, wild boar, hare, roe-deer and fresh-water fish and infection with adult tapeworms (*Taenia solium*, *T. saginata* and *Diphyllobothrium latum*) in man. Special attention is given to cysticerciasis of the brain in man and its diagnosis. Measures for preventing the transmission of these infections from animals to man are outlined. J.M.W.

Proceedings of the Helminthological Society of Washington.

WRIGHT, W. H. & BOZICEVICH, J.—“The occurrence of *Taenia ovis* in dogs at Washington, D.C.” 1 (1), 7. [1934.]

Taenia ovis adults have occurred in two dogs killed in Washington,

R.T.L.

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ABULADZE, K. I., 1964. [Principles of Cestodology, edited by K. I. Skryabin. Vol. IV. Taeniata—cestodes of animals and man and the diseases caused by them.] Moscow: Izdatelstvo "Nauka", 530 pp. [In Russian.]

This 4th volume of "Principles of Cestodology" is a monographic review of the family Taenidae. The first part of the book gives the history of the classification of the group and includes chapters on morphology, ontogeny, life-cycles, and the localization in the final and intermediate hosts. The various taeniid larvae are defined and the term *Armatelathyridium* proposed for armed *Tetrathyridium* larvae, which is further subdivided into *Cladothyridium* and *Armatelathyridium*.

The 2nd, systematic, part contains descriptions of all known species, most of which are illustrated, with synonyms, hosts and geographical distribution. When known, the biology and pathogenicity of the species are discussed. Keys to genera and species are given. Taeniidae is subdivided into 2 subfamilies: Taeniinae and Echinococcinae. The author places the following genera in Taeniinae: *Taenia*, *Taeniarrhynchus*, *Multiceps*, *Hydatigera*, *Fossor*, *Anoploetaenia*, *Dasyurotaenia*, *Insinuataenia*, *Tetratirotaenia* n.g. to accommodate *T. polyacantha* n.comb. for *Taenia polyacantha*, *Cladotaenia* and *Paracladotaenia*. The *Cysticercus* described by Shal'dibin in 1961 from *Ondatra zibethica* belongs in the new genus and is, according to the new nomenclature, an *Armatelathyridium*. 41 species of *Taenia*, 4 of *Taeniarrhynchus*, 9 of *Multiceps*, 4 of *Hydatigera*, 3 of *Fossor*, 11 of *Cladotaenia* and 2 of *Paracladotaenia* are described and discussed. There is no key to the species of *Taenia*. The following new combinations are proposed: *Hydatigera hyperborea* n.comb., *H. rileyi* n.comb., *Fossor monostephanos* n.comb. and *Cladotaenia asiota* n.comb. for species of *Taenia*, and *Paracladotaenia cathartidis* n.comb. for *Cladotaenia* (*Paracladotaenia*) *cathartidis*. The subfamily Echinococcinae contains *Echinococcus* with *E. granulosus*, *E. oligathra*, *E. lycaontis* and *E. felidis*, and *Alveococcus* with *A. multilocularis*. The distribution and incidence of hydatid cysts amongst hosts are discussed in some detail.

The 3rd part, comprising 90 pages, is devoted to the diseases caused by Taeniidae in man and animals. Particular attention is paid to cases of cysticerciasis reported in man and domestic animals in the USSR.

There is a list of the species of Taeniidae (adults and larvae) under hosts, and the bibliography covers 48 pages of which 31 pages refer to Russian publications.

The monograph is the first work summarizing our knowledge of Taeniidae and giving descriptions of all the species of the family up to 1963. It should prove of great value to anybody interested in this important group of tapeworms. J.A.D.

BOEV, S. N., 1960. "On cysticerci of muscles of roe-deer in Kazakhstan." *Helminthologia*. Bratislava, 2 (1), 47-54. [French, German & Russian summaries p. 54.]

Boev reports that cysticerciasis in roe-deer in Kazakh S.S.R. was due to *Cysticercus cervi*. He discusses the specific validity of *Taenia krabbei*, *T. ovis* and *T. cervi* and suggests that only by investigation of various schemes of cross-infection involving roe-deer, dogs, ewes and reindeer, and a thorough study of the morphology of the adult tapeworms would it be possible to establish their specific identity. C.R.

BOEV, S. N., SOKOLOVA, I. B. & TAZIEVA, Z. K., 1964. [Specificity of species causing cysticerciasis in ruminants.] In: Boev, S. N. [Editor], [Parasites of farm animals in Kazakhstan.] Alma-Ata: Izdatel. Akad. Nauk Kazakh. SSR, Vol. III, pp. 7-29. [In Russian.]

To determine the specific identity of cysticerci from sheep, roe-deer and Persian gazelles the authors (i) studied the comparative morphology of the adult worms from carnivores (i.e. *Taenia ovis*, *T. cervi* and *Taenia* sp.), (ii) infected dogs and wild carnivores with the 3 types of cysticerci and (iii) infected 9 species of domestic and wild ruminants with material from the experimentally infected carnivores. They conclude that there are no significant morphological differences between the adults or cysticerci of the 3 forms, which are described, although the cysticerci show some histological differences [see No. 268 below] and differences in their adaptation to the ruminant hosts. *Cysticercus ovis* is a parasite of sheep and can also infect Persian gazelles but shows little adaptation to roe-deer and Saiga antelopes. *C. cervi* is a parasite of roe-deer and can also infect *Cervus elaphus*; Siberian ibex and cattle but shows little adaptation to Persian gazelles and none to sheep. "*Cysticercus djeirani* (= *Taenia djeirani*) n.sp." is a parasite of Persian gazelles and can infect Saiga antelopes, roe-deer and sheep but shows no adaptation to these hosts. The Persian gazelle, roe-deer and Saiga ibex are of no practical importance as wild reservoir hosts of sheep and goat cysticerciasis. G.I.P.

BLUNDELL, S. K., GEMMELL, M. A. & MACNAMARA, F. N., 1968. "Immunological responses of the mammalian host against tapeworm infections. VI. Demonstration of humoral immunity in sheep induced by the activated embryos of *Taenia hydatigena* and *T. ovis*." *Expl Parasit.*, 23 (1), 79-82.

Sera from sheep immunized by 2 intramuscular injections of 10,000 artificially activated embryos of *Taenia hydatigena* or *T. ovis* at 2 and 5 months of age were used to protect sheep passively from a challenge infection of 2,500 eggs of *T. hydatigena* or *T. ovis*. At autopsy there was a reduction of the number of cysts confirming the existence of humoral antibody. Cross protection was found between the species. The transferred serum from donors immunized with homologous or heterologous species has greater protection against *T. ovis* than against *T. hydatigena*. K.H.

Cysticercus ovis and Taenia ovis — Annotated Bibliography 1962-1969

COOK, B. R., 1964. "The epidemiology of *Echinococcus* infection in Great Britain. II. The incidence of *Echinococcus granulosus* and some other cestodes in farm dogs in mid-Wales." *Annals of Tropical Medicine and Parasitology*, 58 (2), 147-152.

The faeces of 87 farm dogs from the Wye Valley area were examined for cestodes after purgation with arecoline-acetarsol at the rate of 18 mg. per 14 lb. body-weight. 62 of the 87 dogs were infected, 20 with an average of 69 *Echinococcus granulosus*. 70% of the farming population of mid-Wales may be directly exposed to hydatid infection. 5 species of *Taenia* were also found; 48 dogs were infected with *T. hydatigena* and 9 with *T. pisiformis*. J.H.B.

DELYANOVA, R. S., 1958 [Helminth fauna of dogs in the Uzbek S.S.R.] *Uzbek. biol. Zh.*, No. 5, pp. 47-57. [In Russian: Uzbek summary p. 57.]

An annotated list is given of the one species of trematode, 9 of cestodes, 9 of nematodes and one of acanthocephalan found on autopsy of 105 stray dogs and on worming a further 107 dogs in the Uzbek S.S.R. The dog is a new host for *Physaloptera sibirica* and *Gongylonema pulchrum*. *Taenia ovis* is recorded for the first time in dogs in the U.S.S.R. These 3, *Rictularia affinis* and *Brachylaemus* sp. are described from specimens collected during this survey. The 28 species of helminths now known for the Uzbek S.S.R. are listed.

G.I.P.

DHABOLKAR, D. B., GHAFOR, M. A. & NARASAPUR, V. S., 1968. "*Cysticercus ovis* in the heart of sheep." [Correspondence.] *Indian vet. J.*, 45 (2), 169.

The occurrence of 5 cysts under the epicardium of the heart of a sheep killed at a Bombay slaughterhouse is reported. The morphology of the cysts is described and they are tentatively identified as *Cysticercus ovis*. J.N.O.

FORBES, L. S., 1961. "Notes on the incidence of Taeniidae in dogs in the North Island of New Zealand." *New Zealand Veterinary Journal*, 9 (4), 77-78.

The over-all incidence of *Echinococcus granulosus* and *Taenia hydatigena* in 2,340 dogs dosed with arecoline hydrobromide was 3.9% and 10.3% respectively. The dogs were from the South Auckland, Rotorua, Taranaki, Wanganui and Hawke's Bay areas. The rate of infection with *E. granulosus* was 2.0% among dogs on dairy farms, 5.5% among dogs on sheep farms and 3.0% among all other dogs. The equivalent figures for *T. hydatigena* infection were 10.3%, 11.0% and 2.0%. The infection rates in dogs regularly dosed with arecoline hydrobromide under a voluntary control scheme were generally reduced, but the incidence of *E. granulosus* in dairy-farm dogs was not significantly altered. 0.4% of the dogs were infected with *T. ovis*, 1.9% with *T. pisiformis* and 0.09% with *Multiceps serialis*. J.H.B.

GEMMELL, M. A., 1962. "Natural and acquired immunity factors inhibiting penetration of some hexacanth embryos through the intestinal barrier." [Correspondence.] *Nature*. London, 194 (4829), 701-702.

Gemmell states that the results obtained from preliminary experiments on the resistance of the intermediate host to the hexacanth embryos of *Taenia ovis*, *T. hydatigena* and *T. pisiformis* supported the theory that immunity against the cystic stage of tapeworms has two parts: an early response which may act at the intestinal level and be the more important, and a late response which acts at the predilection site. The results also suggested that both natural and acquired immunity may occur at the intestinal level and that antibodies produced either against somatic antigens or, more likely, against the metabolic products of embryos undergoing a phase of intense activity, during metamorphosis, are protective. H.H.W.

GEMMELL, M. A., 1964. "Species specificity of the immunogenic complexes of the tapeworm hexacanth embryo." [Correspondence.] *Nature, Lond.*, 204 (4959), 705-707.

Active, resting and killed hexacanth embryos of *Taenia* were suspended in lamb serum (*T. ovis* and *T. hydatigena*) or rabbit serum (*T. pisiformis*) and injected intramuscularly into lambs challenged 8 weeks later with not more than 2,500 eggs of *T. ovis* and *T. hydatigena* and into rabbits similarly challenged with *T. pisiformis*. The results indicate that the whole antigenic complex is species specific but that parts of the protection are common to the embryonic as well as the cystic forms of *T. ovis* and *T. hydatigena*. Shared immunogen between the embryos and cysterci of the 2 sheep cestodes and those of *T. pisiformis*, the rabbit cestode, is less certain. D.W.L.

GEMMELL, M. A., 1965. "Immunological responses of the mammalian host against tapeworm infections. II. Species specificity of hexacanth embryos in protecting rabbits against *Taenia pisiformis*." *Immunology*, 8 (3), 270-280.

Rabbits vaccinated by intramuscular injection with the viable eggs or the activated embryos of *Taenia pisiformis*, *T. ovis* or *T. hydatigena*, were subsequently challenged by mouth with eggs of *T. pisiformis*. A single intramuscular injection of viable eggs or activated embryos of *T. pisiformis* induced a relatively solid immune response to the establishment and also to the long-term survival of the challenge infection of *T. pisiformis*. A single intramuscular injection of the activated embryos of both *T. ovis* and *T. hydatigena* also induced some resistance to the establishment and long-term survival of a challenge infection with *T. pisiformis*, but no significant immune response to a similar challenge infection was detected in those rabbits vaccinated with the viable eggs of these 2 sheep metacestodes. [A.S.] T.Y.

Cysticercus ovis and Taenia ovis — Annotated Bibliography 1962-1969

GEMMELL, M. A., 1965. "Immunological responses of the mammalian host against tapeworm infections. III. Species specificity of hexacanth embryos in protecting sheep against *Taenia ovis*." *Immunology*, 8 (3), 281-290.

60 lambs were divided into 3 groups, each of 20 animals. Half the lambs in each group were vaccinated with viable eggs and half with activated embryos of *Taenia ovis*, *T. hydatigena* or *T. pisiformis*. These lambs, together with 10 controls, were subsequently challenged with eggs of *T. ovis*. Only one of the lambs in the group immunized with *T. ovis* completely resisted the challenge infection, preventing it from reaching maturity at the site of election. No lamb in the group vaccinated with *T. hydatigena* completely resisted the challenge but some animals harboured significantly fewer cysticerci of *T. ovis* than did control sheep or those vaccinated with *T. pisiformis*. The injection of viable eggs or activated embryos of *T. pisiformis* induced no resistance either to the establishment or the subsequent survival of the challenge infection. [A.S.] T.Y.

GEMMELL, M. A., 1966. "Immunological responses of the mammalian host against tapeworm infections. IV. Species specificity of hexacanth embryos in protecting sheep against *Echinococcus granulosus*." *Immunology*, 11 (4), 325-335.

The cross immunity between species of different genera of tapeworms was determined in lambs. Young lambs (40 to 70 days old) reared worm-free were injected intramuscularly with 1,000, 2,000, 5,000, 20,000 or 50,000 viable eggs or activated embryos of *Echinococcus granulosus*, *Taenia hydatigena*, *T. ovis* or *T. pisiformis*. The animals were challenged 94 days later, together with untreated control lambs, by the intraruminal injection of 2,500 fresh eggs of *E. granulosus*. 30 months later the animals were killed and the effect of the vaccination determined by the number of cysts, their viability and the amount of fluid or solid material present. The results showed that vaccination with *E. granulosus* eggs or embryos produced a strong resistance. Some resistance was found in animals vaccinated with *T. hydatigena* and *T. ovis* embryos but little or no resistance was detected in animals vaccinated with embryos of *T. pisiformis* or with *T. hydatigena*, *T. ovis* or *T. pisiformis* eggs. K.H.

GEMMELL, M. A., 1967. "Species specific and cross-protective functional antigens of the tapeworm embryo." [Correspondence.] *Nature, Lond.*, 213 (5075), 500-501.

The possibility of 2 genera of tapeworms sharing part of a functional antigenic complex was tested. Sheep were successfully immunized against *Echinococcus granulosus* with viable eggs of *E. granulosus* but not with viable eggs of *Taenia hydatigena*, *T. ovis* and *T. pisiformis*. Sheep vaccinated with activated embryos of *E. granulosus*, *T. hydatigena* and *T. ovis* became immune to challenge infections of *E. granulosus*. Activated embryos of *T. pisiformis* did not induce immunity to *E. granulosus*. The evidence suggests that there are at least 2 functional antigenic complexes in these parasites. One is species specific, present in the eggs and affects both the establishment and survival of the challenge organism, the other is non-specific, present in activated embryos and affects only the survival of the challenge organism. However, not all species within the same or different genera have a common functional antigen. D.W.L.

GÜRALP, N. & DOĞRU, C., 1967. "Anadolu koyun ve keçilerinde *Cysticercus ovis* 'in yayılışı." *Vet. Fak. Derg. Ankara Univ.*, 14 (2), 234-238. [English & German summaries pp. 237-238.]

The distribution of *Cysticercus ovis* among sheep and goats in Turkey was studied. 10,000 sheep and 409 angora goats were examined in Ankara. 6 (0.06%) of the sheep and one (0.24%) of the goats were found infected. In 4 of the infected sheep the cysts were located in the heart. A single cyst was recovered from the heart of one of the angora goats. The authors fed 2 clean dogs 4 and 5 viable cysts; in 54 and 55 days respectively the dogs began to pass mature segments. At autopsy the dogs were found to be infected with *Taenia ovis*. Y.T.

JOYCE, B. G., 1968. "Hydatids diagnostic station near Dunedin. Is N.Z. watchdog against disease?" *N.Z. Jl Agric.*, 117 (4), 100-103.

About 350,000 samples of dog faeces were examined in 1967 at the hydatids diagnostic station near Dunedin, New Zealand. Since the Hydatids Act of 1959 there has been a decrease in *Echinococcus granulosus* infection from 3.45 to 0.84% and in *Taenia hydatigena* from 11.01 to 4.44%. *T. ovis* has, however, increased from 0.18 to 2.87%. J.H.B.

LISENKO, A. A., 1967. [On *Cysticercus ovis* in sheep in the Rostov region.] [Abstract.] *Problemy Parazit.*, Year 1967, p. 276. [In Russian.]

NEW ZEALAND, 1967. "National Hydatids Council. Annual report and statement of accounts (7th), 1966-67." Wellington: 24 pp.

Despite a reduction from 5.49 to 4.62% in the incidence of *Taenia hydatigena* in dogs in New Zealand over the period 1962-67 major changes in the control system are necessary if complete eradication is to be achieved. *T. ovis* in dogs continues to increase at an average rate of 0.4% yearly. There is evidence that the incidence of *Echinococcus granulosus* in sheep is falling by an average of 4% yearly. Bunamidine hydrochloride has proved highly effective against mature *E. granulosus*, *T. hydatigena* and *T. ovis* in dogs at dose rates of between 25 and 50 mg. per kg. body-weight. 6-weekly dosing is recommended. B.G.

SADIKOV, V. M., 1965. [Incidence of cysticerciasis in the Uzbek SSR.] *Trudy uzbek nauchno-issled. Inst. vet.*, 17, 186-190. [In Russian.]

Cysticercus ovis and Taenia ovis — Annotated Bibliography 1962-1969

SWEATMAN, G. K., 1962. "The importance of the New Zealand campaign against *Echinococcus granulosus* and *Taenia hydatigena* on the prevalence of *Taenia ovis*." *New Zealand Veterinary Journal*, 10 (5), 93-98.

In New Zealand there are one to five dogs per farm and these are commonly fed on sheep carcasses. Almost all dogs are routinely dosed with arecoline hydrobromide 3 times a year. 636,661 faecal samples from dogs were examined and the over-all incidence of *Taenia hydatigena* was 9 to 12% on the North and South Islands except in the urban districts where it was less than 2%; on the Chatham Islands it was 38%. All farming districts showed a marked drop in over-all incidence after the first dosing; further dosing had little effect except in the Chatham Islands. The over-all incidence of *T. ovis* was less than 3% throughout the country and was only slightly influenced by dosing. Among dogs used for rabbit and pig hunting *T. ovis* was found in 15 out of 2,000 and in 2 out of 233 dogs respectively. *T. ovis* was observed in less than 3% of 20,840 lambs and sheep examined by the standard New Zealand meat inspection procedures but the incidence varied greatly among animals from different properties. J.H.B.

SWEATMAN, G. K. & HENSHALL, T. C., 1962. "The comparative biology and morphology of *Taenia ovis* and *Taenia krabbei*, with observations on the development of *T. ovis* in domestic sheep." *Canadian Journal of Zoology*, 40 (7), 1287-1311.

Sweatman & Henshall discuss the distribution of the cysticercus of *Taenia krabbei* in North American cervids, basing their account on the literature and on examination of *Alces alces*, *Odocoileus hemionus* and *Cervus canadensis*. They relate the infections in Alaska and Minnesota to the adult stages in *Canis lupus* and elsewhere to infections in *C. latrans*. They suggest that *T. krabbei* is primarily a parasite of *A. alces* and *Rangifer* spp. where these coexist with *C. lupus*. Infections in herds of *R. tarandus* introduced from Norway seem to be mainly maintained in the dogs used in herding them. The authors have attempted to remove the confusion which exists in relation to the identification of *T. ovis* and *T. krabbei*, and show that, although there may be considerable overlap in the geographical distribution of the two, the former is restricted to sheep and the latter to cervids. They conclude from experimental infections, morphological studies of the eggs and rostellar hooks and the development of the strobila, that *T. ovis* and *T. krabbei* are separate species in which the morphology shows such great overlap that they are indistinguishable. The differences in host requirement and in host response for the 2 forms is considered to be evidence of physiological speciation. D.C.

SWEATMAN, G. K. & WILLIAMS, R. J., 1962. "Wild animals in New Zealand as hosts of *Echinococcus granulosus* and other taeniid tapeworms." *Transactions of the Royal Society of New Zealand. Zoology*, 2 (26), 221-250.

The role of 32 mammals in the maintenance and transmission of *Echinococcus granulosus*, *Taenia hydatigena*, *T. ovis* and *Multiceps multiceps* has been assessed in New Zealand according to: (i) their susceptibility under laboratory and field

conditions; (ii) the longevity of each mammal under field conditions in relation to the time required for the helminths to reach an infective stage; (iii) the geographical location of each mammal; (iv) their proximity to agricultural practices; (v) in the case of intermediate hosts, the opportunity to ingest the helminth ova in relation to their feeding habits, which may vary seasonally and according to population density; and (vi) in the case of a definitive host, its access to intermediate hosts, both wild and domestic. The domestic dog is the only significant carnivore in the maintenance of the 4 species of tapeworms studied. Cats could be experimentally infected with *T. hydatigena* but the worms did not develop fully. Although *T. ovis* became gravid in laboratory cats, 347 wild cats were free from the infection. Mustelids could not be experimentally infected with either *E. granulosus* or *T. hydatigena*. The possum, mouse, rabbit and red deer could be experimentally infected with hydatid but the hedgehog, Polynesian rat, black rat and Norway rat were resistant. Natural infections with hydatid were seen only in wild goats and pigs while *T. hydatigena* occurred in wild goats, wild swine, in red deer, fallow-deer, wapiti and thar. The dogs which are commonly used for catching rabbits are sometimes infected with *E. granulosus* and *T. hydatigena* and those used for hunting pigs have a particularly high incidence of infection with these 2 species. H.H.W.

SWEATMAN, G. K. & WILLIAMS, R. J., 1963. "The significance of the distribution and fluorescence of *Taenia ovis* in sheep in meat inspection procedures." *Research in Veterinary Science. London*, 4 (3), 359-366.

The author infected 13 Romney x Corriedale sheep and 2 goats by giving eggs of *Taenia ovis* in capsules. Post-mortem examination was made 24 days to 16½ months later. The muscles of the sheep were examined by cutting them into slices. Most cysts were found in the heart, diaphragm and in the longissimus dorsi and semimembranosus muscles; the heart and the diaphragm were most frequently infected. If only the heart, diaphragm and masseter muscles had been examined only one of 13 infected sheep would have escaped detection. Examination for cysts under ultra-violet light appeared to be of no advantage because although the cysts fluoresced, the surrounding fat reacted similarly. H.D.C.

TAZIEVA, Z. K., 1964. [Histological differences of cysticerci from ruminants.] In: Boev, S. N. [Editor], [Parasites of farm animals in Kazakhstan.] *Alma-Ata: Izdatel. Akad. Nauk Kazakh. SSR*, Vol. III, pp. 30-33. [In Russian.]
Histological study detected very small differences in *Cysticercus ovis* from sheep and goats and *C. cervi* from roe-deer and more pronounced differences between these 2 species and cysticerci from Persian gazelles, in the structure of the parenchyma, subcuticular cells and muscle layer. G.I.P.

